

WHAT IS CLAIMED IS:

1. A printing device for performing recording on a recording medium, the printing device comprising:

a carriage slidably mounted on the printing device in a lateral direction to scan the recording medium, and movable in a vertical direction to a plurality of predetermined distances above the recording medium during printing;

a print head mounted on the carriage, the print head having a discharge surface with a discharge nozzle located therein, the discharge nozzle for ejecting ink on the recording medium; and

a recovery mechanism for performing recovery of the print head when the carriage is positioned above the recovery mechanism, the recovery mechanism including a carriage lever to engage the carriage and move the carriage in the vertical direction to a predetermined position above the recovery mechanism.

2. A printing device according to Claim 1, wherein the carriage includes a gap lever for positioning the carriage to one of the plurality of predetermined distances above the recording medium.

3. A printing device according to Claim 2, wherein the gap lever has a first end comprising a lever and a second end having a cam, the second end being rotatably mounted on the carriage with the cam disposed adjacent to a guide rail on the recovery mechanism, wherein rotation of the gap lever positions the carriage to one of the plurality of predetermined distances above the recording medium.

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4. A printing device according to Claim 1, wherein a lock pin is mounted on the carriage lever, and wherein the lock pin engages a corresponding pin receptacle on the carriage when the carriage lever engages the carriage, thereby preventing the carriage from moving in the lateral direction.

5. A printing device according to Claim 1, wherein a first end of the carriage lever is pivotally attached to a pivot point on the recovery mechanism, and is rotatable about the pivot point toward the carriage to engage and move the carriage.

6. A printing device according to Claim 5, wherein the recovery mechanism further includes a carriage lever support having a first end which is pivotally attached to the pivot point on the recovery mechanism and having a second end which is connected to a second end of the carriage lever, whereby rotation of the carriage lever support about the pivot point causes rotation of the carriage lever about the pivot point.

7. A printing device according to Claim 6, wherein the recovery mechanism further includes a shift cam which is rotatably mounted on the recovery mechanism, and wherein the carriage lever support further includes a cam following portion which is disposed against the shift cam and which forces the carriage lever support to rotate about the pivot point when the shift cam is rotated.

8. A printing device according to Claim 7, wherein the shift cam is rotatably driven by a gear which is connected to a motor.

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13. A printing device according to Claim 12, wherein the wiper base is slidably mounted so as to be movable in a second lateral direction which is perpendicular to the first lateral direction of the carriage.

14. A printing device according to Claim 12, wherein the wiper base has a top surface which covers and protects the first and second caps from ink ejected from the print head when the wiper base is positioned to cover the caps.

15. A printing device according to Claim 12, wherein the wiper blade cover has a top surface which covers and protects the wiper blade from ink ejected from the print head when the wiper base is positioned to cover the caps.

16. A printing device according to Claim 13, wherein the wiper base is moved in the second lateral direction to wipe the print head by a wiper transmission mechanism which is driven by a motor.

17. A printing device according to 14,
wherein the wiper base includes a first prefire area
and a second prefire area disposed on the wiper base

18. A printing device according to 17, wherein the first and second prefire areas each contain a drain sheet for retaining the received ink.

20. A printing device according to 19,
wherein the second prefire area contains a drain
sheet for retaining the received ink.

21. A printing device according to 17, wherein the wiper blade is mounted at a position on the wiper base which crosses the first and second prefire areas.

22. A printing device according to 17, wherein the wiper blade wipes the first and second sets of discharge nozzles during the prefire recovery operation.

23. A printing device according to 22, wherein each of the first and second sets of discharge nozzles are arranged in a plurality of nozzle sections in the second lateral direction, each nozzle section including a plurality of discharge nozzles, and wherein, during a prefire recovery operation, each nozzle section of discharge nozzles successively ejects ink and is wiped by the

wiper blade as the wiper base moves in the second lateral direction under the print head, the ejected ink from the first and second sets of discharge nozzles being received in the first and second prefire areas, respectively.

24. A printing device for performing recording on a recording medium, the printing device comprising:

a carriage slidably mounted on the printing device in a lateral direction to scan the recording medium;

a print head mounted on the carriage, the print head having a discharge surface with a discharge nozzle located therein, the discharge nozzle for ejecting ink on the recording medium; and

a recovery mechanism for performing recovery of the print head when the carriage is positioned above the recovery mechanism, the recovery mechanism including a cap to cap the print head, and a capping mechanism which includes a cap lever supporting the cap and having a first end which is pivotally attached to the recovery mechanism, a cap lever support having a first end which is pivotally attached to the recovery mechanism and having a second end which is connected to a second end of the cap lever, and a cap lever spring disposed between the cap lever and the cap lever support so as to dampen a force of the cap against the print head during capping.

25. A printing device according to 24, wherein the cap lever has a cap guide which supports a cap base on which a cap holder is mounted, the cap holder having the cap mounted thereon.

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26. A printing device according to 25, wherein the cap base is guided by a vertical guide rail located on the recovery mechanism, so that the cap base moves in a vertically linear path from a resting position to a capping position.

27. A printing device according to 24, wherein the cap is made of an elastic material.

28. A printing device according to 24, wherein the cap is made of rubber.

29. A printing device according to Claim 24, wherein the capping mechanism further includes a cap cam which is rotatably mounted on the recovery mechanism, and wherein the cap lever support further includes a cam following portion which is disposed against the cap cam and which forces the cap lever support to pivot when the cap cam is rotated.

30. A printing device according to Claim 24, wherein the cap cam is rotatably driven by a gear which is connected to a motor.

31. A printing device according to Claim 24, wherein the capping mechanism further includes a cap lever return spring having a first end which is connected to the cap lever support and having a second end which is connected to the recovery mechanism so as to bias the cap lever support and the cap lever towards a resting position which is away from a lateral travel path of the carriage.

32. A printing device for performing recording on a recording medium, the printing device comprising:

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a print head mounted on the carriage, the print head having an uneven discharge surface comprised of a plurality of discharge surface portions, a first set of discharge nozzles disposed in one of the discharge surface portions, and a second set of discharge nozzles disposed in another of the discharge surface portions, each of the discharge nozzles for ejecting ink on the recording medium; and

wherein the wiper blade is partitioned by a plurality of slits into a plurality of blade portions, each blade portion for wiping a respective discharge surface portion.

33. A printing device according to Claim 32, wherein the carriage is moved to a first wiping position for a first wiping of the discharge surface with the wiper blade, and wherein the carriage is moved to a second wiping position for a second wiping of the discharge surface, such that an unwiped portion of the discharge surface corresponds to a location of one of the wiper blade slits when the carriage is in the first wiping position, and the unwiped portion is wiped by one of the blade portions when the carriage is in the second wiping position.

34. A printing device according to Claim 33, wherein an execution time of the first wiping is different than an execution time of the second wiping.

35. A printing device according to Claim 32, further including a wiper blade cleaner mounted on the printing device to clean the wiper blade as the wiper blade is moved across a cleaning surface of the cleaning unit, wherein the cleaning surface has a plurality of cleaning surface sections.

36. A printing device according to Claim 35, wherein each of the plurality of cleaning surface sections corresponds to a respective blade portion.

37. A printing device according to Claim 36, wherein one of the plurality of cleaning surface sections has an open gap through which the corresponding respective blade portion passes during cleaning of the wiper blade by the cleaning unit, such that the respective blade portion is not cleaned by the cleaning unit.

38. A printing device according to Claim 37, wherein each of the remaining cleaning surface sections has a cleaning edge to clean the respective blade portion.

39. A printing device according to Claim 38, wherein the cleaning edges of a first group of cleaning surface sections are disposed at a first position on the cleaning surface, and the cleaning edges of a second group of cleaning surface sections are disposed at a second position on the cleaning surface, such that the cleaning edges of the first group engage their corresponding respective blade portions before the cleaning edges of the second group engage their corresponding respective blade portions, as the wiper blade is moved across the cleaning surface of the cleaning unit.

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40. A printing device according to Claim 32, wherein the plurality of blade portions include a flap-side blade portion for wiping a side of the print head, a flap-edge blade portion for wiping one of the discharge surface portions which corresponds to an outer edge area of the discharge surface, a first nozzle blade portion for wiping the discharge surface portion which corresponds to the first set of discharge nozzles, a second nozzle blade portion for wiping the discharge surface portion which corresponds to the second set of discharge nozzles, and a middle blade portion for wiping one of the discharge surface portions corresponding to an area of the discharge surface which is located between the first and second sets of discharge nozzles.

41. A printing device for performing recording on a recording medium, the printing device comprising:

a carriage slidably mounted on the printing device in a first lateral direction to scan the recording medium;

a print head mounted on the carriage, the print head having an uneven discharge surface comprised of a plurality of discharge surface portions, and having a first set of discharge nozzles disposed in one of the discharge surface portions and a second set of discharge nozzles disposed in another of the discharge surface portions, the discharge nozzles for ejecting ink on the recording medium; and

a recovery mechanism for performing recovery of the print head when the carriage is positioned above the recovery mechanism, the recovery mechanism including

a carriage lever to engage the carriage and move the carriage in the vertical

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a first cap and a second cap to cap the first and second sets of discharge nozzles, respectively,

a wiper base which is slidably mounted on the recovery mechanism, wherein the wiper base is moved to cover the caps when the caps are not capping the print head,

a wiper blade mounted on the wiper base to wipe the discharge surface of the print head, the wiper blade being partitioned by a plurality of slits into a plurality of blade portions, each blade portion for wiping a respective discharge surface portion of the print head,

a first prefire area and a second prefire area disposed on the wiper base for receiving ink ejected from the first and second sets of discharge nozzles, respectively, during a prefire recovery operation, and

a wiper blade cover to cover the wiper blade when the wiper blade is not wiping the print head.

42. A method in a printing device which performs recording on a recording medium, the

44. A method according to Claim 43, wherein the gap lever has a first end comprising a lever and a second end having a cam, the second end being rotatably mounted on the carriage with the cam

45. A method according to Claim 42, wherein a lock pin is mounted on the carriage lever, and wherein the lock pin engages a corresponding pin receptacle on the carriage when the carriage lever engages the carriage, thereby preventing the carriage from moving in the lateral direction.

47. A method according to Claim 46, wherein the recovery mechanism further includes a carriage lever support having a first end which is pivotally attached to the pivot point on the recovery mechanism and having a second end which is connected to a second end of the carriage lever, whereby rotation of the carriage lever support about the pivot point causes rotation of the carriage lever about the pivot point.

48. A method according to Claim 47, wherein the recovery mechanism further includes a shift cam which is rotatably mounted on the recovery mechanism, and wherein the carriage lever support further includes a cam following portion which is disposed against the shift cam and which forces the carriage lever support to rotate about the pivot point when the shift cam is rotated.

49. A method according to Claim 48, wherein the shift cam is rotatably driven by a gear which is connected to a motor.

50. A method according to Claim 47, wherein a carriage lever spring is disposed between the carriage lever support and the carriage lever, thereby dampening a force which the carriage lever applies against the carriage.

51. A method according to Claim 42, wherein the recovery mechanism further includes a limiting post which prevents the carriage lever from moving the carriage in the vertical direction to a position greater than the predetermined position above the recovery mechanism.

52. A method according to Claim 50, wherein the carriage lever support is connected to a first end of a carriage lever return spring, a second end of the carriage lever return spring being connected to the recovery mechanism so as to bias the carriage lever support and the carriage lever away from a lateral travel path of the carriage.

53. A method in a printing device which performs recording on a recording medium, the printing device including a carriage slidably mounted on the printing device in a first lateral direction to scan the recording medium, a print head mounted on the carriage, the print head having a discharge surface with a first set of discharge nozzles and a second set of discharge nozzles located therein, each set of discharge nozzles for ejecting a different type of ink on the recording medium, the method comprising the steps of:

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56. A method according to Claim 53, wherein the wiper blade cover has a top surface which covers and protects the wiper blade from ink ejected from the print head when the wiper base is positioned to cover the caps.

58. A method according to 55, wherein the wiper base includes a first prefire area and a second prefire area disposed on the wiper base top surface for receiving ink ejected from the first and second sets of discharge nozzles, respectively, during a prefire recovery operation.

60. A method according to 58, wherein the first prefire area is located away from the location of the first and second caps, and has an opening for draining the received ink to an area of the printing device located below the wiper base.

62. A method according to 58, wherein the wiper blade is mounted at a position on the wiper base which crosses the first and second prefire areas.

63. A method according to 58, wherein the wiper blade wipes the first and second sets of discharge nozzles during the prefire recovery operation.

64. A method according to 63, wherein each of the first and second sets of discharge nozzles are arranged in a plurality of nozzle sections in the second lateral direction, each nozzle section including a plurality of discharge nozzles, and wherein, during a prefire recovery operation, each nozzle section of discharge nozzles successively ejects ink and is wiped by the wiper blade as the wiper base moves in the second lateral direction under the print head, the ejected ink from the first and second sets of discharge nozzles being received in the first and second prefire areas, respectively.

65. A method in a printing device which performs recording on a recording medium, the printing device including a carriage slidably mounted on the printing device in a lateral direction to scan the recording medium, and a print head mounted on the carriage, the print head having a discharge surface with a discharge nozzle located therein for ejecting ink on the recording medium, the method comprising the steps of:

moving the carriage in the lateral direction to a position adjacent to a recovery mechanism; and

rotating a cap lever support of a capping mechanism disposed in the recovery mechanism, the cap lever support having a first end and a second end, the first end being pivotally attached to the recovery mechanism and the second end being connected to a second end of a cap lever which supports a cap for capping the print head, the cap lever having a first end which is pivotally attached to the recovery mechanism, the capping mechanism further including a cap lever spring disposed between the cap lever and the cap lever support,

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66. A method according to 65, wherein the cap lever has a cap guide which supports a cap base on which a cap holder is mounted, the cap holder having the cap mounted thereon.

68. A method according to 65, wherein the cap is made of an elastic material.

69. A method according to 65, wherein the cap is made of rubber.

70. A method according to Claim 65, wherein the capping mechanism further includes a cap cam which is rotatably mounted on the recovery mechanism, and wherein the cap lever support further includes a cam following portion which is disposed against the cap cam and which forces the cap lever support to pivot when the cap cam is rotated.

71. A method according to Claim 65,
wherein the cap cam is rotatably driven by a gear
which is connected to a motor.

72. A method according to Claim 65,
wherein the capping mechanism further includes a cap

73. A method in a printing device which performs recording on a recording medium, the printing device including a carriage slidably mounted on the printing device in a lateral direction to scan the recording medium, and a print head mounted on the carriage, the print head having an uneven discharge surface comprised of a plurality of discharge surface portions, a first set of discharge nozzles disposed in one of the discharge surface portions, and a second set of discharge nozzles disposed in another of the discharge surface portions, each of the discharge nozzles for ejecting ink on the recording medium, the method comprising the steps of:

moving the carriage in the lateral direction to a first wiping position adjacent to a wiper blade, the wiper blade being partitioned by a plurality of slits into a plurality of blade portions; and

wiping with the discharge surface of the
print head with the wiper blade,

wherein each blade portion of the wiper blade wipes a respective discharge surface portion of the discharge surface.

74. A method according to Claim 73,
further comprising the steps of:

moving the carriage in the lateral direction to a second wiping position adjacent to the wiper blade; and

wiping with the discharge surface of the

wherein an unwiped portion of the discharge

75. A method according to Claim 74,

76. A method according to Claim 73,

77. A method according to Claim 76,

78. A method according to Claim 77,

79. A method according to Claim 78,

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82. A method in a printing device which performs recording on a recording medium, the printing device including a carriage slidably mounted on the printing device in a lateral direction to scan the recording medium, and a print head mounted on the carriage, the print head having an uneven discharge surface comprised of a plurality

moving a wiper base in a recovery mechanism to a cover position in which the wiper base covers a first cap and a second cap provided in the recovery mechanism, the wiper base having a wiper blade mounted thereon, the wiper blade being covered by a wiper blade cover when the wiper base is at the cover position, thereby protecting the caps and the wiper blade during non-use, the wiper base further including a first prefire area and a second prefire area disposed on the wiper base for receiving ink ejected from the first and second sets of discharge nozzles, respectively, during a prefire recovery operation;

raising a carriage lever connected to the recovery mechanism to engage the carriage with the carriage lever;

moving the carriage in the vertical direction with the carriage lever to a predetermined position above the recovery mechanism;

performing a prefire operation and a wiping operation of the print head while the carriage is in the predetermined position, the first and second prefire areas receiving the ink ejected from the first and second sets of discharge nozzles during the prefire operation, and the wiping operation performed with the wiper blade which is partitioned by a plurality of slits into a plurality of blade

portions, each blade portion for wiping a respective discharge surface portion of the discharge surface;

moving the wiper base away from the cover position to uncover the first and second caps;

rotating a cap lever support of a capping mechanism disposed in the recovery mechanism, the cap lever support having a first end and a second end, the first end being pivotally attached to the recovery mechanism and the second end being connected to a second end of a cap lever which supports the first and second caps for capping the print head, the cap lever having a first end which is pivotally attached to the recovery mechanism, the capping mechanism further including a cap lever spring disposed between the cap lever and the cap lever support, thereby raising the first and second caps to engage and cap the print head, during which a force of each cap against the print head is dampened by the cap lever spring;

applying a suction force to the discharge surface of the print head while the cap is engaged to the print head;

rotating the cap lever support to lower the first and second caps from the print head;

moving the carriage in the vertical direction with the carriage lever away from the predetermined position; and

lowering the carriage lever to disengage the carriage from the carriage lever.

83. Computer-executable process steps stored on a computer readable medium, said computer-executable process steps for performing a method in a printing device which performs recording on a recording medium, said computer-executable process steps comprising process steps executable to perform a method according to any of Claims 42 to 82.

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84. A computer-readable medium which stores computer-executable process steps, the computer-executable process steps to perform a method in a printing device which performs recording on a recording medium, said computer-executable process steps comprising process steps executable to perform a method according to any of Claims 42 to 82.

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